5.5 Water Supply

5.5.1 Introduction

This assessment of environmental consequences focuses on whether implementation of a new reservoir operations policy would change reservoir elevations or tailwater minimum flows in a manner that would:

- Limit supply by constraining withdrawals for municipal and industrial uses;
- Increase the cost of obtaining supplies, as expressed in pumping costs or costs for new or modified intake structures; or
- Degrade water supply quality and thereby limit water supply through increased treatment requirements.

5.5.2 Impact Assessment Methods

The analysis for water supply is based on output from the WSM, which provided (among other things) changes in reservoir elevations, and output from the Water Quality Model, which provided data relative to changes in DO and algae formation. Using these data, the Base Case and action alternatives were evaluated using the methods of analysis described below.

Reservoir Elevations and Intake Structures

Changes in reservoir elevation were evaluated to determine whether:

- Alternative minimum reservoir elevations would fall below water supply intake structure elevations; or,
- Changes in elevations would affect the energy requirements for pumping water from the reservoirs and thereby constrain supply.

For all reservoirs with public supply and industrial water intakes, the proposed minimum reservoir elevations under each action alternative were compared to the TVA-published minimum reservoir elevation for the reservoir. A summary is shown in Table 5.5-01. All intakes in the reservoir were installed to be below the published normal minimum operating level. Footnoted entries in Table 5.5-01 indicate that five alternatives would result in elevations below the published minimum elevation. It should be noted that not all 35 reservoirs in the system were subjected to simulated elevations. Some, such as Fort Patrick Henry, Melton Hill, Apalachia, and the Ocoee Reservoirs, were not expected to experience elevation changes under any of the alternatives. The reservoirs that are discussed in the following pages were selected because their intakes were sufficiently large that mitigation costs could be substantial if an alternative would result in an adverse effect.

Table 5.5-01 Comparison of TVA-Published Minimum Reservoir Elevations to Existing and Proposed Elevations

Reservoir	TVA-Published Minimum Elevation (ft)	Base Case and Action Alternative Minimum Reservoir Elevations (ft)								
		Base Case	Reservoir Recreation A	Reservoir Recreation B	Summer Hydropower	Equalized Summer/ Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred
Watauga	1,915	1,920.9	1,931	1,932	1,778.9[1]	1,913.4[1]	1,890.9[1]	1,924.9	1,936	1,913.8[1]
South Holston	1,675	1,681.3	1,688	1,694	1,676	1,676	1,676	1,698.1	1,679.7	1,676
Boone	1,330	1,355.7	1,355.7	1,355.7	1,354.9	1,361	1,355.7	1,355.7	1,355.7	1,361.2
Cherokee	1,020	1,026.6	1,027.6	1,029	981.0[1]	1,025.1	1,010.1[1]	1,029.4	1,030	1,020
Douglas	940	940	940	940	910.0[1]	940.5	932.8[1]	940	940	935[1]
Norris	960	970.8	974.6	978.3	900.0[1]	959.2	946.1[1]	977.5	973.2	960
Fontana	1,575	1,575	1,575	1,575	1,518.0[1]	1,575	1,553.4[1]	1,575	1,575	1,575
Chatuge	1,905	1,909.3	1,910.3	1,911.2	1,860.0[1]	1,906.4	1,893.3[1]	1,903.7[1]	1,904.9[1]	1,905
Nottely	1,735	1,741.1	1,742.6	1,743.9	1,690.0[1]	1,739	1,721.9[1]	1,733.5[1]	1,734.8[1]	1,735
Hiwassee	1,450	1,458.8	1,461.2	1,463.4	1,413.2[1]	1,451.3	1,438.5[1]	1,447.9[1]	1,450	1,450
Blue Ridge	1,590	1,639.6	1,642.5	1,646.7	1,611.7	1,626.6	1,644.8	1,647.5	1,618.5	1,644.8
Tims Ford	865	870	871.2	871	855.0[1]	864.6	863.1[1]	871	871.2	870
Fort Loudoun	807	808	809.5	809.5	808	807	809.5	809.5	809.5	808
Watts Bar	735	736	737.5	737.5	736	735	737.5	737.5	737.5	736
Chickamauga	675	676	677.5	677.5	676	675	677.5	677.5	677.5	676
Nickajack	632	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5	632.5
Guntersville	593	593.3	593.3	593.3	593.3	593.3	593.3	593.3	593.3	593.3
Wheeler	550	551	552.5	552.5	551	551	552.5	552.5	552.5	551
Wilson	504.5	505.5	505.5	505.5	505.5	505.5	505.5	505.5	505.5	505.5
Pickwick	408	409	410.5	410.5	409	409	410.5	410.5	410.5	409
Kentucky	354	354.3	354.3	356	354.3	354.3	356	356	354.3	354.3

[1] Indicates elevations below the published minimum elevation.

Cherokee Reservoir

Morristown on Cherokee Reservoir has a municipal intake designed for operation with a minimum water level of 1,020 feet. Under both the Summer Hydropower Alternative and the Commercial Navigation Alternative elevations would be lower than 1,020 feet. Should reservoir elevations fall below 1,020 feet, an old intake at Morristown that is at the level of the original river channel could be used to supply some water when the reservoir level is as low as 1,000 feet.

Under the Summer Hydropower Alternative, the elevation of Cherokee Reservoir is predicted to be below elevation 1,020 feet for 125 weeks during 100 years and below elevation 1,015 feet for 94 weeks during 100 years. The minimum elevation during the 100-year period is expected to be 980 feet. The minimum elevation was found to occur during August and September, when peak demand conditions occur. Because of the frequency and duration of occurrence of elevations below the existing operating level, there is no practical way to modify the existing intake either on a permanent or temporary basis to provide the required water supply reliability. In these circumstances, it was assumed that a new intake would be required. Based on recent construction costs of other intakes similar to the existing Morristown design, the cost of a new intake would be about $5 million.

Under the Commercial Navigation Alternative, it is expected that the reservoir elevation would be below 1,020 feet for 16 weeks out of 100 years and below elevation 1,015 feet for 5 weeks out of 100 years. The approximate minimum elevation would be about 1,010 feet. Reservoir levels below 1,020 feet would all occur in the October–November time frame, when municipal demands are near or below the annual average demand. With the existing intake, it was assumed that approximately one-half of the projected 2030 demand of approximately 12 mgd could be produced under the Commercial Navigation Alternative. It was further assumed that the existing intake and pumps could be modified to provide the remaining 6 mgd. Installation of temporary pumps might also be required to pump into the existing intake wet well for a limited period of time. These modifications were estimated to cost approximately $1 million.

Norris Reservoir

The two alternatives with elevations below the published minimum elevation (960 feet) were the Summer Hydropower Alternative, with a minimum elevation of 900 feet, and the Commercial Navigation Alternative, with a minimum elevation of 946 feet. (Although the minimum elevation under the Commercial Navigation Alternative would be below the published minimum elevation, its minimum elevation would not affect Lafollette.) The Lafollette intake has a provision for the installation of a temporary pump should elevations go below 900 feet, the elevation of the City of Lafollette's intake. Therefore it was assumed that the Summer Hydropower Alternative would incur a cost of approximately $20,000 for temporary pumping for the period that the reservoir elevation reached elevation 900 feet.

Douglas Reservoir

The Sevier Water Board has an intake in Douglas Reservoir. According to plans approved by TVA for this intake, the lowest elevation for the intake was to be 926.5 feet. The Summer Hydropower Alternative has a minimum elevation of 910 feet. Because it is unlikely that the reservoir is sufficiently deep at the intake's location to allow the existing intake to be extended to a depth to accommodate an elevation of 910 feet, it was assumed that the intake would need to be moved approximately 2 miles and a new intake would need to be constructed. The total cost was expected to be $3 million. Under the Commercial Navigation Alternative, the minimum reservoir elevation was projected to be 932.8 feet, which is above the 926.5-foot elevation to which the intake was supposed to be functional. To allow for the uncertainty at which elevation the intake would continue to function, it was assumed that a cost of $26,000 would be incurred to connect temporary pumps and to modify private and commercial intakes. The Preferred Alternative has a minimum elevation of 935 feet, which is below the minimum published elevation. As for the Commercial Navigation Alternative, a $26,000 cost was assumed for potential temporary pumping and private/commercial intake modification to accommodate the minimum elevation event.

Chatuge Reservoir

The city of Hiawassee, Georgia has a floating intake on Chatuge Reservoir. Based on depth soundings beneath the intake, it was estimated that the reservoir level could drop to elevation 1,895 feet and the intake would still continue to function. Although elevations for the Tailwater Recreation and Tailwater Habitat Alternatives fall below the published minimum elevations, the minimum elevations for these alternatives are still above 1,895 feet. The minimum elevation for the Commercial Navigation Alternative is 1,893.3 feet, which is below the existing limitation of 1,895 feet. It was assumed that this elevation could be reached through a modification of the existing intake at a cost of $50,000. The existing intake cannot be modified to reach elevation 1,860 feet as required under the Summer Hydropower Alternative; therefore, it was assumed that a new intake must be constructed. The cost for the new intake in deeper water plus approximately 2.5 miles of pipeline to carry the water to the treatment plant was estimated at $2.2 million.

Nottely Reservoir

An intake tower for the Notla Water Company has been recently installed in the Nottely forebay. The lowest level from which water can be withdrawn is 1,733 feet. Both the Summer Hydropower and Commercial Navigation Alternatives resulted in minimum pool levels much below this level. Therefore, it was assumed that the intake would need to be reconstructed at a location farther out in the reservoir, at an estimated cost of $2.25 million.

Tims Ford Reservoir

An elevation of 855 feet at Tims Ford was recently experienced due to a drawdown necessary for dam repair. No adverse impacts were reported to TVA. Therefore, it was assumed that an elevation of 855 feet is possible without modification of any intakes.

Fontana and Hiwassee Reservoirs

Three alternatives would result in impacts on a few private or commercial intakes on these reservoirs.

Reservoir Elevations and Pumping Requirements

Table 5.5-02 shows the amount of water projected to be pumped from selected reservoirs in 2030. The difference in pumping energy required to lift water from the reservoir between the Base Case and each action alternative was computed. The computation was conducted by determining the difference in median elevation between each action alternative and the Base Case for each month for each reservoir.

Table 5.5-03 compares the difference in pumping energy required for each action alternative compared to the Base Case.

Table 5.5-02 2030 Total Average Water Supply Pumping Rates

Reservoir	Average 2030 Annual Water Pumping Affected by Reservoir Level (mgd)
South Holston	4.5
Chatuge	1.4
Cherokee	25.9
Douglas	5.1
Fort Loudoun	74.9
Norris	2.5
Watts Bar	50.0
Chickamauga	49.3
Nickajack	89.9
Guntersville	98.0
Wheeler	412.1
Wilson	53.0
Pickwick	92.2
Tims Ford	2.8
Nottely	1.0
Kentucky	136.1

Table 5.5-03 Change in Pumping Energy Required by Policy Alternatives

Action Alternative	Difference in Pumping Energy Compared to the Base Case (millions of KWh/yr)[1]
Reservoir Recreation A	-1.4
Reservoir Recreation B	-2.0
Summer Hydropower	0.9
Equalized Summer/Winter Flood Risk	-0.3
Commercial Navigation	-0.8
Tailwater Recreation	-2.0
Tailwater Habitat	-1.6
Preferred	-0.7

[1] A negative number indicates that the alternative requires less energy than the Base Case. A positive number indicates that the alternative requires more energy than the Base Case.

Water Supply Quality and Treatment

Water quality, in relationship to water supply, was analyzed for effects on water supply treatment requirements due to changes in algae concentrations, the potential for increased concentrations of soluble iron and manganese, and increased turbidity. The algal biomass concentrations in the photic zone (where light is available) were used to rate the alternatives; they represent a surrogate metric for dissolved organic matter (DOM), taste and odor impacts, and operational difficulties related to algae concentrations. Analysis of the water volume with DO less than 1 mg/L was used as a surrogate for the potential for soluble iron and manganese formation. Storm water runoff brings large amounts of sediment into the streams, rivers and reservoirs of the Tennessee River watershed. Storm events increase the cost of water treatment. However, none of the reservoir operational changes will affect the amount of sediment that enters the reservoir system. Operational changes that result in longer reservoir retention times might result in slightly more settling of suspended solids. However, experience with the water quality models used for the ROS evaluation indicated that suspended solids concentrations would vary by less than 10 mg/L among the alternatives (Shiao pers. comm.). Bohac (2003) showed that, for a change of 5 to 10 mg/L, the costs to water treatment systems in the Tennessee River watershed were insignificant. Therefore, no comparison of alternatives was made based on suspended solids.

Algae

Algae can cause taste and odor problems for water treatment plant operators, can contribute to the formation of DBPs, and can also contribute to operational problems such as reduced filter run times. Water quality modeling was used to investigate these potential effects by examining differences in algae concentrations between the alternatives. Reservoir maximum algae concentrations were calculated for the 8-year water quality simulation period (1987 to 1994), as shown in Table 5.5-04.

Table 5.5-04 Comparison of Maximum Algae Concentrations by Policy Alternative

Reservoir	Maximum Algae Concentration (mg/L)								Range between Alternatives (mg/L)
	Base Case	Reservoir Recreation A	Reservoir Recreation B	Equalized Summer/Winter Flood Risk	Commercial Navigation	Tailwater Recreation	Tailwater Habitat	Preferred	
Cherokee	5.2	5.2	5.2	5.1	5.2	5.2	5.2	5.1	0.1
Douglas	3.5	3.8	3.8	3.4	3.5	3.8	3.8	3.4	0.4
Norris	1.3	1.3	1.4	1.5	1.3	1.5	1.4	1.4	0.2
South Holston	6.5	6.5	6.5	6.2	6.5	6.5	6.5	6.5	0.3
Watauga	3.5	3.8	4.9	5.0	3.5	4.8	4.6	5.1	1.6
Boone	6.4	6.8	6.5	6.8	6.5	6.5	6.7	6.7	0.4
Fort Patrick Henry	3.7	3.8	3.8	3.8	3.8	3.8	3.6	3.9	0.3
Melton Hill	6.0	6.0	6.0	6.3	5.9	5.8	6.2	5.7	0.6
Chickamauga	2.4	2.5	2.5	2.0	2.3	2.5	2.0	2.3	0.5
Fort Loudoun	5.1	5.2	5.2	4.7	4.6	5.0	4.9	5.1	0.6
Guntersville	8.3	8.6	8.6	8.0	8.3	8.6	8.3	7.1	1.5
Kentucky	3.4	3.4	3.4	3.4	3.4	3.5	3.4	3.2	0.3
Nickajack	2.6	2.7	2.6	2.1	2.4	2.7	2.4	2.5	0.6
Pickwick	6.8	6.5	6.6	6.5	6.7	6.4	6.5	6.3	0.5
Watts Bar	4.7	5.1	4.9	3.6	4.0	5.0	5.3	4.6	1.7
Wheeler	7.7	7.7	7.6	7.5	8.3	7.6	7.7	6.4	1.9

Even though there were slight differences between alternatives for any one reservoir, the differences in maximum concentrations were generally small on most reservoirs (Table 5.5-04). In addition, none of the alternatives exhibited a pattern of being consistently better or worse than any other alternative when all reservoirs were considered.

As discussed in Section 5.4.13, an analysis of chlorophyll-a concentrations and retention times suggested that all of the action alternatives except the Commercial Navigation Alternative could result in higher chlorophyll-a (algae) concentrations in some reservoirs.

Iron and Manganese

Reservoir water volumes with DO concentration below 1 mg/L were used as an indicator for the relative potential for soluble species of iron and manganese to form in reservoir bottoms; and they were used to rank each alternative on tributary, transitional, and mainstem reservoirs.

Based on the average rank, the Base Case and the Commercial Navigation Alternative appeared to have the lowest potential for soluble iron and manganese species formation across all reservoirs evaluated. The order of increasing potential for iron and manganese formation was the Preferred Alternative, followed by Reservoir Recreation Alternative A and the Equalized Summer/Winter Flood Risk Alternative. Reservoir Recreation Alternative B, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative have the highest potential for iron and manganese formation.

Because of volume differences between alternatives on tributary reservoirs, the ratios of water with DO less than 1 mg/L to total volume were investigated. It was determined that some of the effect of larger amounts of low DO water would be offset by more total water in the reservoir. As such, differences between alternatives based on ratios of low DO water to total water volume were less important than differences based only on low DO volume.

It is unclear to what degree water treatment plants could be affected by elevated concentrations of soluble iron and manganese. Many existing treatment plants have multiple-level intakes that allow iron- and manganese-rich water to be avoided. Therefore, even if some alternatives result in elevated soluble iron and manganese concentrations, treatment plants might be able to avoid potential impacts. Water treatment plant operators on South Holston, Cherokee, Douglas, Melton Hill, and Fort Loudoun Reservoirs stated that no treatment is presently required for iron and manganese. Treatment plant operators on Chickamauga, Nickajack, and Wheeler Reservoirs also confirmed that they do not now treat for iron and manganese.

The cost of chemicals to treat the differences in soluble iron and manganese that could arise if an alternative to the Base Case was implemented was estimated for Cherokee and Douglas, two reservoirs where the potential for soluble iron and manganese formation appeared to be the greatest. The additional cost for treatment was less than $5,000 per year, suggesting that any increase in soluble iron and manganese could be treated at little additional chemical cost, although some modification to process equipment might be required. However, because treatment plants presently do not routinely treat for soluble iron and manganese, initiating treatment for them would require process changes and increased operator attention. These changes might be more significant than the additional chemical costs would suggest. Implementing an alternative that would require a treatment plant to change from no treatment for soluble iron and manganese to treatment for these constituents could adversely affect some treatment plants.

Evaluation of tributary and mainstem reservoirs suggested that iron and manganese concentration differences between alternatives should be several times less on the mainstem than on the tributaries. The occurrence of low DO water in mainstem reservoirs also was cyclic over the summer, increasing in volume and then decreasing in volume only to increase again. It was also observed that the location of the water with DO below 1 mg/L typically occurred in the last few miles of the reservoir, in the forebay next to the dam. By contrast, the water with DO below 1 mg/L on tributary projects existed for most of the length of the reservoir. This also suggests that unless an intake was located in the forebay of a mainstem reservoir, water that could contain elevated iron and manganese concentrations could be avoided.

5.5.3 Base Case

Under the Base Case, the reservoirs would be operated to provide for the 2030 water demand and maintain minimum flows below reservoirs. In other words, no limitation is placed on water demand. However, there are existing intakes and there could be new intakes in tailwaters where minimum flows are provided. Because expansion of the withdrawal of the existing intakes or the additional withdrawal of the new intakes could affect the minimum flow, a case-by-case environmental analysis would be required for new intakes or expansion of existing ones. The water for future demand is available under the Base Case, but where it would be extracted from the system is an issue to be addressed on a case-by-case basis.

Elevations in reservoirs and tailwaters under the Base Case would be within the published minimum elevations for reservoirs and would not affect intake structures; pumping costs would not increase. Under the Base Case, water quality and related treatment requirements would not change.

5.5.4 All Action Alternatives

Under each action alternative, the reservoirs would also be operated to provide for the 2030 water demand and maintain minimum flows below reservoirs. As in the case of the Base Case, each action alternative places no limitation on water demand. However, where water can be extracted without substantially affecting minimum flows would remain an issue to be addressed for each alternative. Therefore, the water supply availability and the minimum flow issues would not be any different for any action alternative than they would be for the Base Case. Therefore, no specific analysis of these issues was performed, and they were not included in the following table. Table 5.5-05 shows the potential effects of the action alternatives on water supply delivery (cost) and water supply quality (treatment).

Table 5.5-05 Impacts on Water Supply by Action Alternative

Alternative	Water Supply Delivery (Cost)	Water Supply Quality (Treatment)
Reservoir Recreation A	Elevation changes under Reservoir Recreation Alternative A would not affect intake structures or require modifications to structures. Elevation changes would require less energy (1.4 million kWh/yr less) for pumping than under the Base Case.	Algae concentrations on some reservoirs could be higher than under the Base Case. Iron and manganese formations would be higher than under the Base Case.
Reservoir Recreation B	Reservoir Recreation Alternative B would not require modifications to intake structures and would require less energy for pumping (2.0 million kWh/yr less) than under the Base Case.	Algae concentration on some reservoirs under Reservoir Recreation Alternative B could be higher than under the Base Case. Reservoir Recreation Alternative B, the Tailwater Recreation Alternative, and the Tailwater Habitat Alternative have the highest potential for soluble iron and manganese formation.
Summer Hydropower	Elevation changes under the Summer Hydropower Alternative would result in seven reservoirs requiring modifications of their intake structures to ensure reliable supply. The cost of these modifications is estimated at $12.5 million dollars, the greatest increase in impact above the Base Case for all eight alternatives. The Summer Hydropower Alternative also has the greatest increase in energy demand for pumping (requiring 0.9 million kWh/year more) than under the Base Case.	Water quality modeling was not completed for the Summer Hydropower Alternative due to too little water in some reservoirs under dry conditions. In years for which simulations results were available, the potential for iron and manganese ranged from lowest to highest—depending on year and reservoir.
Equalized Summer/ Winter Flood Risk	Elevation changes under the Equalized Summer/Winter Flood Risk Alternative will not affect intake structures and will have lower pumping requirements (0.3 million kWh/yr) than under the Base Case.	Algae concentration on some reservoirs under the Equalized Summer/Winter Flood Risk Alternative could be higher than under the Base Case. The Equalized Summer/Winter Flood Risk Alternative has a higher potential for soluble iron and manganese formation than the Base Case and the Commercial Navigation Alternative.
Commercial Navigation	Elevations under the Commercial Navigation Alternative would require modifications to intake structures at seven reservoirs. Costs for these modifications are estimated at $3.4 million. This alternative would require less energy (0.8 million kWh/yr) for pumping than under the Base Case.	Algae concentration across the system under the Commercial Navigation Alternative would be the about the same as under the Base Case. The Commercial Navigation Alternative is similar to the Base Case in terms of potential for iron and manganese formations. The Commercial Navigation Alternative would not increase treatment costs above those for the Base Case.

Table 5.5-05 Impacts on Water Supply by Action Alternative (continued)

Alternative	Water Supply Delivery (Cost)	Water Supply Quality (Treatment)
Tailwater Recreation	Elevations under the Tailwater Recreation Alternative would require very minor modifications at three reservoirs to allow for limited temporary pumping. Estimated costs are $22,500. The Tailwater Recreation Alternative is equivalent to the Summer Hydropower Alternative, requiring less energy (2.0 million kWh/yr) for pumping than under the Base Case	Algae concentrations on some reservoirs under the Tailwater Recreation Alternative could be higher than under the Base Case. The Tailwater Recreation Alternative is similar to Reservoir Recreation Alternative B in terms of the potential for soluble iron and manganese formation.
Tailwater Habitat	Elevations under the Tailwater Habitat Alternative would require minimal temporary modifications to intake structures at two reservoirs, with an estimated cost of $21,000. Energy requirements are less (1.6 million kWh/yr) than under the Base Case.	Algae concentrations on some reservoirs under the Tailwater Habitat Alternative could be higher than under the Base Case. The Tailwater Habitat Alternative has the highest potential for soluble iron and manganese formation.
Preferred	Elevations under the Preferred Alternative would require minimal temporary modifications to intake structures on one reservoir, with an estimated cost of $26,000. Energy requirements are less (0.7 million kWh/yr) than under the Base Case.	Algae concentrations on some reservoirs under the Preferred Alternative could be higher than under the Base Case. The Preferred Alternative has slightly higher potential for soluble iron and manganese formation than the Base Case and the Commercial Navigation Alternative but less potential than Reservoir Recreation Alternative A.

Note: Water supply availability would not be affected under any action alternative and therefore was not included in the table.

5.5.5 Summary of Impacts

A summary of the alternative analysis is presented in Table 5.5-06. The alternatives were ranked from 1 to 8, with ties using the average rank. A “1” ranking is best, and an “8” ranking is worst. Algae concentrations showed little differences between alternatives. Chlorophyll-a concentrations and retention times suggested that the Base Case and the Commercial Navigation Alternative would have the lowest algae concentrations. The Base Case and the Commercial Navigation Alternative were also ranked best (lowest) in regard to iron and manganese formation. The rankings in Table 5.5-06 were based on the potential for soluble iron and manganese formation since the algae analysis did not help to distinguish between alternatives. The table also shows the sum of the intake modification costs and the present value of the difference in pumping costs, assuming a 30-year time horizon, 6-percent interest rate, and cost of power of $0.051/KWh. Because the Base Case and all the action alternatives are equal in terms of meeting the future water demand (water supply demand), this criterion was not summarized in Table 5.5-06.

Table 5.5-06 Summary of Impacts on Water Supply by Policy Alternative

Alternative	Water Supply Quality[1]	Water Supply Delivery
Base Case	No change 1.5	No change $0
Reservoir Recreation A	Slightly adverse 4.5	Slightly beneficial -$1 million
Reservoir Recreation B	Adverse 7	Slightly beneficial -$1.4 million
Summer Hydropower[2]	No change to adverse	Substantially adverse $13.1 million
Equalized Summer/Winter Flood Risk	Slightly adverse 4.5	Slightly beneficial -$0.2 million
Commercial Navigation	No change 1.5	Adverse $2.8 million
Tailwater Recreation	Adverse 7	Slightly beneficial -$1.4 million
Tailwater Habitat	Adverse 7	Slightly beneficial -$1.1 million
Preferred	No change to slightly adverse 3	Slightly beneficial -$0.5 million

1 Ranked on a scale of 1 to 8, where 1 is best and 8 is worst, with ties using the average rank of alternatives that tie. Three alternatives tied for 6th, 7th, and 8th place; therefore, each was assigned the average value of 7.

2 Water quality modeling could not be completed for the Summer Hydropower Alternative because of too little water in some reservoirs under dry conditions. In years for which simulations results were available, the potential for iron and manganese ranged from No Change to Adverse, depending on year and reservoir.